Cpl Hall

2661349.

ROYAL AIR FORCE.

Notebook for use in Schools and in General Education Scheme Classes.

Started Friday April 1st

SECTION I.   AIR DEFENCE

Precis I. an air defence system.

Introduction

I.1 The function of any air defence system must be to protect the defended area from air attacks (including airborne landings) by :-

   a) Destroying enemy

   b) Harassing the enemy aircraft thereby reducing the accuracy of their attack

   c) Minimizing the effects of successful attack

I.2. To enable this to be done, the system must possess :-

   a) Suitable weapons

   b) Means of using these weapons.

   c) component organization by which the system can be alerted

I.3. Contemporary weapons of air defence are :-

   a) "DAY" and "ALL WEATHER" fighter aircraft

   b) "heavy" & "light" anti-aircraft artillery

   c) Guided missiles

   D) Defensive radio countermeasures

   e) Means of target concealment (smoke screen, camouflage etc

(f) decoy Targets

(g) measures Taken for civil defense (air-raid warnings & services, fire fighting, bomb disposal units, medical services etc).

Weapons (A) (b) & (c) are active; (e) (f) & (g) passive; (d) part active, part passive.

I.4. The means for using these weapons include:-

(a) airfields & launching sites
(b) air - navigation & warning sites
(c) supply service
(d) communications
(e) skilled personnel.
(f) a tactical control organisation to ensure that the weapons are deployed and employed in order to gain maximum advantage over the enemy.
(g) a fighter control system for guiding fighters towards attacking enemy aircraft. Essential because of :-

(i) The great altitude at which attacking aircraft can fly.
(ii) The high speed at which attacking aircraft can operate
(iii) The need to intercept in conditions of cloud, bad visibility and darkness.

I 5. The component organisation to which is assigned the task of alerting the air defences is known as a "reporting system". Fully developed reporting systems also greatly assist those exercising control functions by continuing to track enemy raids after first detection and by reporting the movement of friendly aircraft.

The Control & Reporting System

I.6. The activities of tactical control, fighter control, & reporting are interdependent & are best discharged by a single integrated organisation. This is known as a Control & Reporting (C&R) System.

Reporting Organisation

I.7. A fully developed reporting system seeks to achieve the aims mentioned in para 5 by:-

(a) operating a chain of early warning radar stations which:-

(i) are positioned to afford maximum vertical and horizontal cover over the approaches to the defended areas

(ii) maintain a continuous search for a long range incoming responses which may well be the first indication of enemy air attacks

(b) maintaining a network of reporting units both radar and ground observer teams the former including those mentioned in para 7(a) charged with the task of reporting all activity (both friendly & hostile) significant to the air defence organization.

(c) Producing a continuous & current air picture as a means both of alerting & informing the control & civil defence organizations.

I.8. General Situation maps (G.S.M's) This picture is displayed to the users in general situation maps. A G.S.M is a map of the defended area (or part of it) its approaches, upon which symbols are moved indicating air activity.

I.9. Symbols. In order that the air activity be adequately represented, the symbols must show as accurately as possible for each unit of air activity (formation or single A/C): —

(a) Position
(b) Direction of flight
(c) Strength
(d) Height.

This process is known as track production. To complete the picture a further process is necessary; that of determining the

track's identity (hostile or friendly). This is known as raid recognition.

I.10 A reporting System under attack. A reporting System must be able to operate when the enemy

(a) takes offensive action against it, by:-
(i) electronic interference
(ii) Physical assault.

(b) Attempts to overwhelm the defenses by attacking in great Number (Saturation Tactics).

Control organization

I.11. The tasks of control organization is :-

(a) To exercise tactical control, which involves:-

(i) Ensuring that weapons are held at suitable states of preparedness

(ii) Meeting every attack however many there may be, with best use of weapons available

(iii) Ensuring the most economical use of weapons when attacked by superior enemy forces

(iv) Co-ordinating the efforts of the air defence of the whole area.

(b) To direct fighters (fighter control) against attacking enemy A/C.

I.12. Tactical Control. To ensure the most effective tactical control of the defenses of

any large area it is expedient. —

(a) To divide the whole area into "sectors".

(b) To delegate responsibility for Tactical control to the commander of each sector

(c) To exercise overall control of the Sector (as when Necessary) from a central point in order to: —

(i) Reinforce hard pressed sectors

(ii) Co-ordinate the efforts of all sectors.

T.13. Fighter Control to fulful its functions (para 4(g)) of directing fighter a/c into contact with enemy a/c, the fighter control System must

(a) Possess complete radar cover over the defended area & its approaches.

(b) Have an efficient method of communication with airborne fighter a/c

(c) Continue to operate through radar & radio interference

(d) not breakdown when enemy employs "Saturation" Tactics.

Static & mobile Defence Systems.

Static Defence System
T.14 This type of System (e.g. that of the U.K.) is suited to the defence of

large areas containing the resources
on which a Nation depends for the prosecution
of a major war.

Mobile Defence System

I.15. This type ~~of~~ (e.g that associated with
the second Allied Tactical Air Force) is
best suited for use in areas where the
land battles are expected to be fluid.

Note

Trainees will be expected to concentrate their
studies upon the static air defence system of
the U.K. this being the most highly deve-
loped of all air defence organisation.

Section II The Reporting System

of the United Kingdom

Precis 2. The Reporting organisation in
the U.K.

Introduction

2.11. The function The task of the U.K.
Reporting System is to :—
   (a) Detect at the earliest possible
moment all enemy A/C. (or long range
missiles) approaching Great Britain.

(b). Provide to the various users a continuous current picture of all air activities (hostile & friendly) over Great Britain its approaches which is significant to the air defence organization.

2.2. Users Served. The air picture produced is displayed on G.S.M's. It is used principally by :—

(a) Sector Controllers (Representing Sector Commanders) & their staffs to enable them to bring the necessary air defences under their control into action

(b) Fighter Controllers at G.C.I. (Ground Control Intercepting) Stations to enable them to identify targets allotted to them by their parent Sector Operations Centres (S.O.C's).

(c) The Command Controller in the Air Defence Operations Room, to enable him maintain overall direction & co-ordination of the air defences of the country.

(d) Anti-aircraft (A.A) Artillery officers for early warning & recognition of approaching targets.

(e) Civil Defence authorities to

control the air raid warning system through which the passive defences such as fire services, bomb disposal units etc, are alerted.

2.3. Reporting Terminology The student should be familiar with the special meaning which the following words have acquired in reporting usage:-

(a) "Raid" Any unit of air activity, whether it be a single A/C or a formation, hostile or friendly is known as a "raid".

(b) "Track" The represented movement on a "display" table of a raid, is known as a "track".

<u>Sources of Information</u>

<u>Reporting Sources</u>

2.4. Reports on air activity are received from :-

(a) Radar Stations

(b) Royal Observer Corps (via R.O.C centres - see precis 4 para 3).

(c) other sources - these include pilots sighting report.

2.5. <u>Radar Stations</u> Various types of radar equipments are used, each having a specific role to play in providing maximum horizontal and vertical cover over the U K air seaward approaches (see precis 11)

2.6. Royal Observer Corps. The R.O.C
reports A/c movements over-land & coastal
waters. Depends on human visual
aural powers. Reports are restricted
by visibility & height limitations but
the R.O.C is a valuable source of
information concerning A/c flying
below radar cover.

The passage of information from
source to user

2.7. Deployment of Radar Reporting units
(R.R.U's)

(a) R.R.U's of different types are used
together in order to provide complete vert-
cal coverage over a given horizontal
area. Consequently considerable
vertical overlap commonly exists
between stations of different types.
(see FIG I)

(b) R.R.U's of any one type are
usually sited sufficiently close to-
gether to produce a considerable amount
of overlapping cover. This is necessary
as a safeguard against damage
to, or failure of a station.

See FIG I over ⟶

FIG. I.

HEIGHT

RANGE.
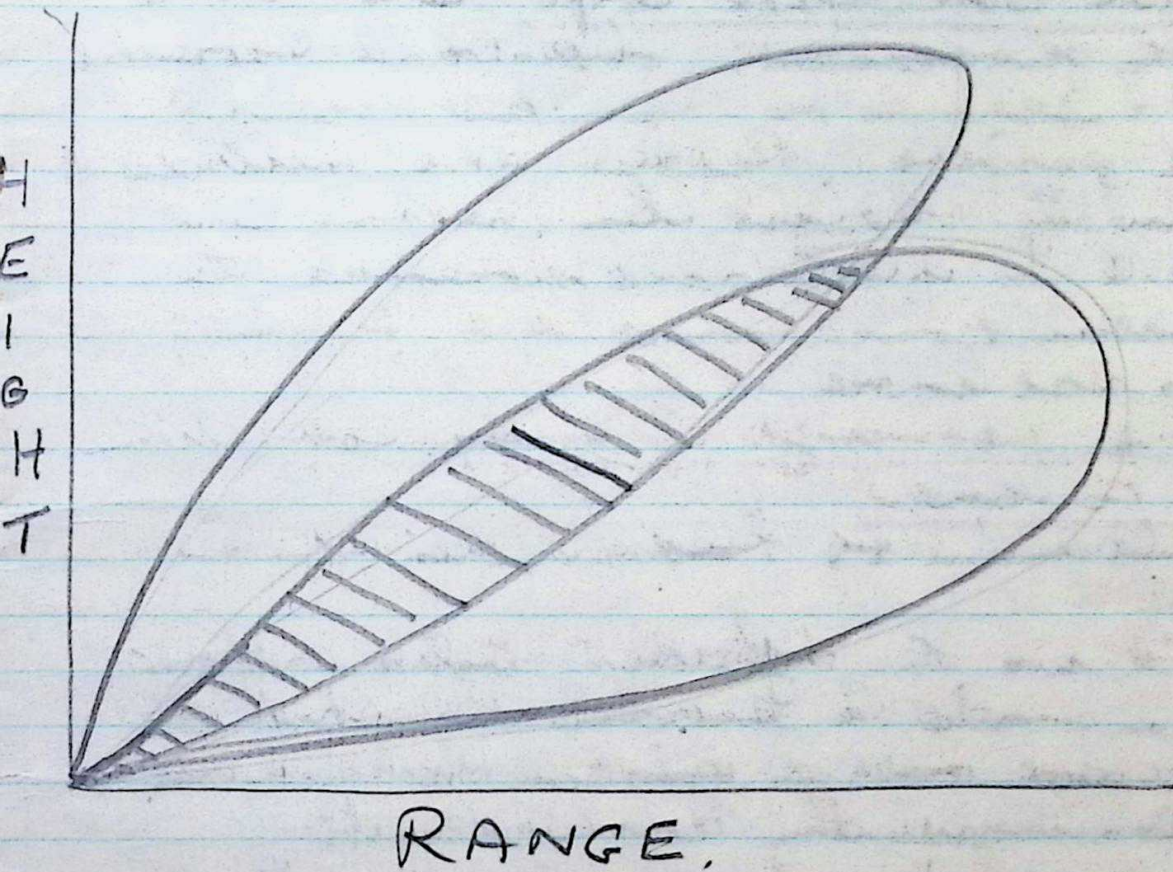
2.8. Resultant multiplication of reports

(a) Because of the overlapping cover of R.R.U's., aircraft are frequently under simultaneous observation by more than one station.

(b) multiple reports so occasioned often differ in their estimates of the true position, strength & height of the same raid.

(c) to transmit all these varying reports direct to the F.S'ns would produce a confused and exaggerated picture

(d) hence all reports are subjected to a "filtering" process before being displayed.

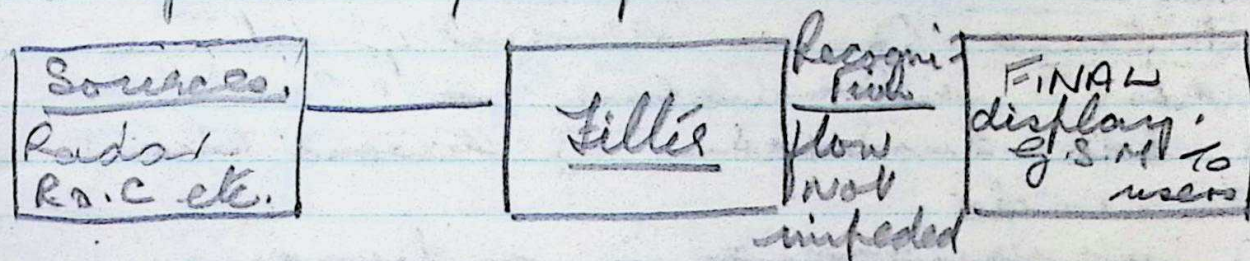2.9. "Filtering". As a result of filtering the "raw" information:—

(a) All duplication of reports should be eliminated

(b) Inaccuracies in individual reports can be reduced by correlation with current report from other stations and earlier reports from the same station.

(c) A number of disjointed reports concerning a raid can be compounded to form a continuous, coherent, track (a process known as "track producing")

2.10. Raid Recognition For the final display to be useful to the user a clear distinction must be made between hostile & friendly tracks. This is achieved largely by a process of elimination (e.g by having a pre-knowledge of all movements of friendly A/C and relating it to the filtered picture.) The responsibility for this process, known as raid recognition is delegated to a specialist section within the reporting centre (see Precis 23)

2.11. **Necessary Path of reports.** Consequen[t]
report[s] must be subjected to treatment in
the following sequence.

```
┌─────────────┐          ┌─────────┐┌──────────┐┌──────────┐
│ Sources.    │          │         ││Recogni-  ││ FINAL    │
│ Radar       │──────────│ Filter  ││tion      ││ display  │
│ R.O.C etc.  │          │         ││flow      ││ g.s.m. to│
│             │          │         ││not       ││ users    │
└─────────────┘          └─────────┘│impeded   │└──────────┘
                                    └──────────┘
```

2.12 **Centralized Combined Filter Plot (CCFP).**
In the United Kingdom, both track
production & raid recognition are effected
at a number of centres known as C.C.F.P's.
The reporting sources (Radar, R.o.c. etc) feed
their information to C.C.F.P's., the C.C.F.P's
feed their information filtered air picture
to the users g.s.m's.

2.13. **Communications.** All communicati[on]
between reporting sources - filter - & users
are carried out over a network of
direct land lines. Between reporting
sources & C.C.F.P's. two way lines are
used whereas information passed from
C.C.F.P's to the users is broadcast over
unidirectional lines.

─────────

Section II. The Reporting Systems of the United Kingdom

Precis 3. The Centralized Combined filter Plot.

Introduction

3.1 In each sector there is a centre known as a Centralized Combined filter Plot (C.C.F.P) where a current air picture is produced of activity over the sector & its seaward approaches. The limits of a sector's tracks production area (e.g. that covered by local reporting units) do not generally exactly coincide with the sector boundaries, but the divergencies are small

3.2 Reports are received by plotters seated around display tables positioned on the floor of a well lighted room. Balconies around the room afford a clear view of all the tables to those whose task it is to:-

(a) Control the composition of the air picture.

(b) Identify the tracks produced.

(c) Tell out the information to users.

Producing the air picture

3.3. The essentials required to produce a current air picture within a C.C.F.P. are :-

(a) **Display Tables** Usually four or five Tables of suitable size are used. The breakdown of the map of the Sector area enables filterers & plotters to reach at least the centre of each Table. The combined Tables show :-

(i) A complete map of the sector & its seaward approaches.

(ii) Overlap areas (approximately 30 miles wide) into adjacent sectors.

(iii) A Geographical reference (GEOREF Precis 16) graticule by which plotting & telling is effected.

(b) **Filter Supervisors** One or two supervisors work at each Table, dependent on the amount of air activity. They produce the tracks from the "raw" information displayed by the plotters around their particular Table.

(c) **Plotters** A number of plotters, plot by means of symbols, information received from their respective reporting sources.

(d) Display Symbols. There are two distinct kinds handled respectively by

   (i) Plotter – Symbols of distinctive colour or shape denoting the individual Nation & type of radar.

   (ii) Filter Supervisors – To display the filtered air picture.

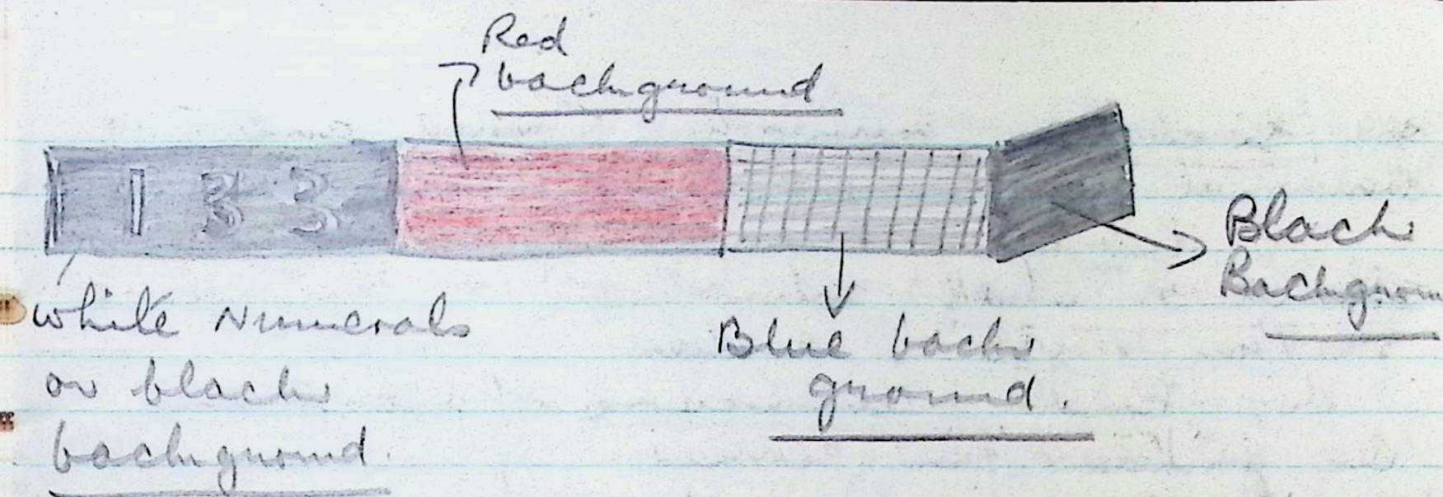(e) a recognition Section Charged with the task of determining the identity of all tracks produced by the filterers.

(f) Tellers. who tell out the filtered air picture to the G.S his of the users.

Track Designation

3.4. a track designation consists of a track serial number preceded by a recognition prefix letter.

Track Serial Number

3.4. To avoid confusion, each track produced is allotted a serial number (10-999), by which it is known throughout its existance. Serial numbers are painted on strips of metal known as "raid plaques". The remained of the plaque is used to display ancillary information (FIG 2) ⟶

Red background

Blue back ground.

Black Background

white Numerals on black background.

3.6. Allocation of Serial Numbers

Numbers are allocated to -

(a) C.C.F.P's each C.C.F.P. has an exclusive block of 3 figure Numbers (the allocation is listed in the appropriate F.C.C. & R. Proc. Inst.,) This block is sub-divided between the Number of Tables used, a Number is allotted consecutively to each new track originated in his Table, by the filter supervisor concerned.

(b) R.O.C. Centres Each R.O.C. centre uses a block of numbers (10-99) which are allotted consecutively to each track originated by the R.O.C. posts within a group area. R.O.C. Centres are identi-fied by the addition of a suffix letter to the Serial Number. (e.g Winchester 24 W)

NOTE For continuity of tracks passing from Sector to Sector each C.C.F.P. holds a block of serial Numbers exclusive to other C.C.F.P's, serial numbers with

suffix letters indicating R.O.C. control
beyond its track production boundaries.

Track Identity
37. ~~Prefix letter~~ A letter is used to
indicate the decision of the raid
recognition officer concerning the track's
hostile or friendly identity. The letters
used are :-

    H - Hostile
    X - unidentified
    F - friendly fighter.
    A - allied (other friendly A/C)
    M - mix up (of friendly fighters with
        H or X raids)

NOTE
a track - during the short time prior
to receiving the R.R.O's decision, having
No identification prefix, is known as
"SERIAL" (e.g "Serial 159').

Track Continuity
38. There is a possibility that inaccur-
acies in reports of plan position received
from R.R.U's on A/C flying in, or near to,
inter-table boundaries ~~they~~ cause plots
to :-
    (a) Fall on two adjacent tables or be
filtered as separate tracks

(b) Be ignored by filter supervisors at both Tables, each assuming the other is handling the track.

(a) or (b) above could occur either between

(i) adjacent Tables within a C.C.F.P. or

(ii) Tables at adjacent C.C.F.P's. (where the inter-Table boundary is also the inter-sector boundary)

3.9   The dangers in para 8 are obviated :—

(a) Internally within a C.C.F.P. by co-operation between the filter supervisors concerned when each :—

(i) filters the track to his Table boundary

(ii) filters the first position on the Table to which the track passes.

(b) Between the adjacent C.C.F.P. is by inter C.C.F.P. & plotter / teller handover process where :—

(i) Filter Tables of any one C.C.F.P. depict not only the sectors territory but also a boundary fringe (overlap) some 20-30 miles deep, being part of adjacent sectors' territories (See fig 3)

(ii) Each C.C.F.P. is allowed to filter (& recognise) only within its sector boundaries, overlap information being displayed "for information only".

(iii) An 'overlap' plotter displays overlap

information which consists of both raw & filtered information passed to him by an 'overlap' Teller at n adjacent Sector.

Scheme of overlap Communications between Teller Tables in Adjacent C.C.F.P.'s

Table at CCFP "A"   Table at CCFP "B"
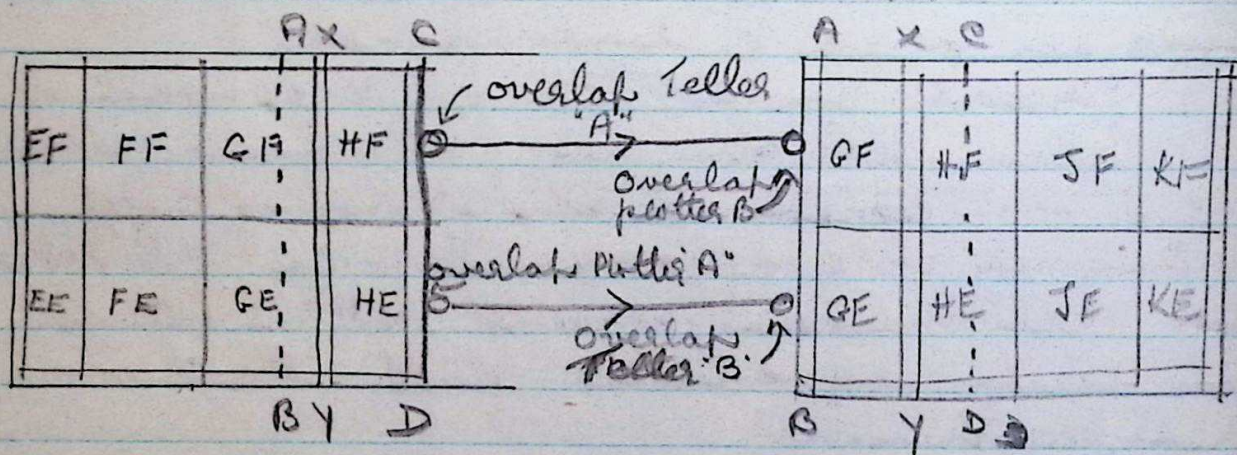

FIG 4.

Key. XY - Sector boundary.
    ABXY - CCFP in B's overlap into Sector 'A'
    XYDC - CCFP in A's overlap into Sector 'B'
    Overlap Teller 'A' tells all activity within
    ABYX to overlap plotter 'B'
    Overlap Teller 'B' tells all activity
    within XYDC to overlap plotter 'A'

Thus all activity in area ABDC
on both Tables the filter Supervisor in

Sector "A" being responsible for A B Y X and filter supervisor in Sector "B" for X Y D C.

3.10. By this procedure :-

(a) Each filter supervisor knows which reports are, which are not receiving attention & by whom.

(b) Each filter supervisor can utilize all reports in his tracks although because of positional inaccuracies, some plots fall outside his area of responsibility.

(c) Track continuity is maintained

Personnel & duties

3.11. C.C.F.P. personnel & their duties are specified in the appropriate F.C.C. & R. Proc Inst. All students must make themselves fully acquainted with the duties of key personnel.

Equipment - Procedure & techniques

3.12. For details of CCFP Equipment & procedure & techniques for track production see Precis 18.

3.13. Landlines - All information from reporting sources is passed over land lines speech circuits which pass via the "change-over panel" (C.O.P) see para 14 situated within the C.C.F.P. whence they are routed to jacks positioned around the filter tables. Filtered information is "Broadcast" out over a land line network to

the users.

3.14 Change-over Panel - All operating lines to & from a C.C.F.P. pass via this panel which is the responsibility of the floor supervisor. The purpose of the C.O.P is to enable :-

(a) all lines to be monitored & tested without undue interruption of the flow of information

(b) Re-routing of lines internally around the filter tables, if & when the occasion demands.

(c) The filter controllers to broadcast instructions to all R.R.U's by connecting the incoming land lines to a single position on his keyboard

3.15. Keyboards. Key personnel within the C.C.F.P. are provided with a multiline keyboards with :-

(a) Direct "private line" contact with those whom immediate & frequent access is imperative.

(b) Lines to an operating P.B.X. (telephone switch board) for calls which are important but less frequent

(c) Lines to the stations P.B.X for access to the G.P.O. telephone system.

Precis 4.   The Royal Observer Corps

Introduction

4.1. The Royal Observer Corps (R.O.C.) is an integral part of the Reporting System in the United Kingdom. It is in peace-time almost wholly manned by spare time volunteers. In war, whole-time personnel would be directed into the corps to enable the system to maintain 24 hour watches.

4.2. Function. To observe (either visually or aurally) and report on A/c movements over the U.K. its coastal waters.

Organization.

4.3. The R.O.C. operates throughout England, Scotland, Wales and Northern Ireland under the Administrative & Operational Control of the Commander in Chief, Fighter Command. Its Status is comparable with that of a fighter group it is commanded by the Commandant R.O.C. an Air Commodore, R.A.F. whose deputy is an Observer Captain R.O.C. It is organized as follows:-

(a) R.O.C. H.Q. located at H.Q. Fighter Command. R.O.C. Headquarters joins with H.Q. Fighter Command operations staff in determining the policy for the integration of the R.O.C. with other parts of the Reporting System.

(b) Areas.

(i) Administrative control of the R.O.C. is delegated to six area Headquarters with territory equivalent to the parent R.A.F. Sector.

Metropolitan — (No11 Sector)
Southern — (Southern Sector)
Eastern — (Eastern Sector)
Western — (Western Sector)
Northern — (Northern Sector)
Scottish — (Caledonian Sector)

Each area is commanded by a spare time Observer Captain R.O.C with a whole time Commander R.O.C as his deputy.

(ii) Operational control of the R.O.C Groups within an area is the responsibility of the appropriate Sector Commander.

(c) Group. Each area is divided into a number of groups

Altogether there are thirty one R.O.C. groups, each commanded by a spare time Observer Commander R.O.C. whose deputy is a full time Observer Lieutenant.

(i) Operational Function Operation centres known as "R.O.C. Centres" are maintained at each Group HQ, where information from associated R.O.C. "Clusters" see para 3(d), is received & correlated prior to onward transmission to R.A.F. i.e. F.P.'s.

(ii) Administrative Function The R.O.C. centres Post within each group are administered by Group HQ.

(d) Posts Dependent on the size of the R.O.C. Group between 30 & 60 posts, situated between 6-10 miles apart, report to a Group Operations centre a spare time Chief Observer (equivalent to a S.N.C.O) is in charge of each post. A number of adjacent posts (usually 4 but occasionally 3) sharing a common reporting land-line to known as a "Cluster". Each post is responsible for observing (visually & aurally) movements of A/C over its area of responsibility and, in conjunction with the other

posts in its cluster passing the maximum information on such movements to the R.O.C Centre. All reports are given in approved sequencies & include details of strength, A/C Type, height, plan position & any relevant information considered significant to the air picture.

The operations centre

4.4.

Layout

The centre consists of a room with gallery around three sides. On the fourth side is a vertical display board (see 4(d)(ii) below). The Room contains:-

(a) main plotting table. This table shows a horizontal map with (Georef graticule) of the groups territory & immediate surrounds on a scale of 1" - 1 mile (Fig.)

(b) Vertical long range plotting table. This board is a map of the group territory & that of adjacent groups on a scale of 3" - 1 mile.

(c) Gallery. This is fitted with tables & keyboards it is used by the controller, supervisors & tellers, & affords a clear view of the displays.

4/8. Personnel. The following personnel are employed by R.O.C. centres:-

(a) Duty Controller. This officer is responsible for ensuring the maximum effective employment of the centre & associated posts as a reporting source & liaises with the R.O.C. L.O. at the parent C.C.F.P.

(b) Assistant Duty Controller. Additional functions as Inter-Group liaison.

(c) Post Controller. He is responsible to the Duty Controller for the supervision of the reporting activities of the the clusters.

(d) Plotters

(i) Main Table Plotter. These plotters positioned around the table receive reports over land lines from the clusters & display by means of symbols.

(ii) Long Range Plotter. Tracks approaching the group are displayed by "long range" plotters on the vertical board by means of magnetic symbols. This information is received over land lines from adjacent

groups or in coastal areas, form
the C.C.F.P.

(c) Tellers.

(i) C.C.F.P. Tellers. Positioned in the
gallery they report to the C.C.F.P
land table those tracks on the
main plotting table recognized
as "Hostile" "Unidentified" or as
"friendly fighters" (or as otherwise
instructed by the Filter Controller
through his R.O.C. L.O.)

(ii) Inter group Tellers. They
report tracks moving from their
group to adjacent groups.
NOTE. Floor Supervisors; Table Plot
Guides; Recorders & Raid orderlies are
also provided.

The Post.

4/6. The main considerations in
the selection of a site for an R.O.C
post are:—

(a) A position which affords the
best view of the allotted area
of responsibility (e.g Tower, high
building, hilltop etc) having regard
to the coverage afford by associat-
ed Posts.

(b) an open topped structure which
ensures some degree of protection

(sandbagged emplacement, brickwork etc) against high wind & bad weather.

4.7. Post Equipment. Each R.O.C post is equipped with the following:-

(a) a "post instrument". This is used to calculate plan position & height of A/C.

(b). Binoculars

(c) Fixed Telephone. Each post shares with other posts in the cluster a telephone line to the R.O.C. centre. Thus besides reporting activity within its area a post receives warning of approaching tracks either from the plotter at the centre or by overhearing information passed by other posts within the cluster.

4.8. Personnel. Peacetime strength required to maintain continuous watch at any one post is 16 observers. Each watch consists of 2 observers, one to operate the post instrument & the other to pass the information obtained required.

Quality of Reports.

4.9. In daylight in clear weather tracks of A/C from ground level up to medium height (say 18,000)

are reported with accuracy of speed both as planned position + height. The fact that the R.O.C. receives A/C under these conditions greatly assists the Raid Recognition officer in his duties — In very clear conditions as when as when curtails are forming accurate tracking at much greater height is achieved, In darkness or when there is low cloud of reduced visibility tracking is dependent on the triangulation of sound bearings from various posts + the quality of reports is seriously affected.

<u>Comparison of R.O.C & Radar as Overland Reporting Source.</u>

410 the relative effectiveness of the R.O.C. & radar in overland reporting may be compared as follows :—

(a) Low Cover :—

(i) <u>Radar.</u> Radar is limited by curvature of the earth (?) + screening from hills, woods buildings etc.

(ii) <u>R.O.C.</u> The R.O.C suffers from the same limitations but, because its posts

are cited much more closely together their
effect is substantially reduced.
(b) Medium & High Cover.
(i) Radar C.H.B. units give good
results. Large scale activity may,
however "saturate" the tellers & plotters.
(ii) R.O.C. R.O.C. reporting deteriorates
with increasing A/c height about
about 15,000 ft. though below this
height the saturation level is generally
higher than that of the C.H.B. chain.
(c) Limitation imposed by Weather Conditions.
(i) Radar. Radar is affected little,
or not at all, dependent in its wave-
length) by weather.
(ii) R.O.C. despite aural reporting,
the R.O.C. suffers a reduction in
effectiveness in conditions of reduced
visibility.
(d) Recognition.
(i) Radar Recognition is only possible
when a radar response can be ass-
ociated with I.F.F. response indicating
that tracks friendly identity.
(ii) R.O.C. The fact that the R.O.C
can recognise visual A/c, assists
the Raid Recognition officer & helps to
maintain continuity of tracking in
a confused situation. In particular

(d) ~~Recognition~~

~~(i) Radar.~~

it allows the posts to concentrate their attention on those attacks which are of interest to the defences.

(e) Jamming

(i) Radar. Vulnerable to Radio jamming.

(ii) R.O.C. The R.O.C. cannot be jammed by radio jamming

(f) Vulnerability to attack.

(i) Radar. Radar employs exposed aerial systems difficult to camouflage.

(ii) Roc. Any person anywhere with a telephone (or radio) can become a reporting source in an emergency. R.O.C. centres are, however, vulnerable to air attack.

Equipment & procedures.

4.11. The equipment used and procedures employed by R.O.C. are described in the R.O.C. manual A.P. 3215.

Section III. The Control System of the U.K.

Precis 5. The Control organization

Introduction

5.1. The A.O.C. in C. Fighter Command is responsible for the Air Defence of the U.K. areas within 40 miles of its coast, as the Air Defence Commander, Great Britain.

5.2. Fighter Command is divided into Groups. No 81. Group - the training group does not concern us here. Nos. 11 & 12 groups are operational groups & subdivided in regions called Sectors each of which contain a number of stations. Each of these levels, except the group level, has responsibilities for the tactical control of operations. In the following paragraphs the control organization & the division of responsibilities within are described.

Organization and responsibilities

5.3. The control organization together with the reporting organization form the control & reporting system. Within the control organization operational activities at the higher levels are centred in the :-

(a) Air Defence Operation Centre.
(A.D.O.C.)

(b) Sector Operation Centre.
(S.O.C's)

There is an S.O.C. per sector.

5.4 Responsibility for Tactical Control

The Air Defence Commander delegates the responsibility the tactical control within their areas to Sector Commanders, but retains the responsibility for overall control.

5.5 A.D.O.C. From this centre the Air Defence Controller, the (C. in C. or one of his appropriate deputies) exercises:-

(a) Co-ordination of effort. He ensures that adjacent Sectors do not duplicate the interception of a raid that appears to threaten both sectors.

(b) Control of Reinforcements. He re-inforces any hard pressed the fighter a/c from other sectors.

5.6. Sector Operating Centre. From this Centre the Sector Controller maintains tactical control over the

defences of his sector. He:-

(a) Assesses the enemy threat to his sector from a display of the current air activity (G.S.M)

(b) Initiates action by the defences.

5.7. Subordinate Operational Centres. Orders from the S.O.C. are implemented by:-

(a) Ground Control Interception (G.C.I) Stations. Fighters are initially despatched to intercept a raid by order of the Sector Controller. On becoming airborne the fighters are controlled by a selected G.C.I. Station. Each G.C.I Station comprises:-

(i) Radars.

(ii) Display Hall with G.S.M showing a duplicate of Sector air picture to enable the Chief Controller to direct the activities of interception cabins.

(iii) Interception cabins (commonly 3 or 4) where radar & radio facilities enable the interception controller to direct fighters against the Targets specified by the Sector Controller.

(b) Wing Operation Rooms. These centres at the Operational fighter Stations are responsible for:-

(i) Implementing orders to dispatch
fighters (scramble orders) received
from S.O.C.

(ii) Selecting squadrons, flights,
sections, pairs or individual A/C
to maintain the preparedness ordered by
the Sector Command Controller.

NOTE.

A/C at "Standby" (the highest state of
"readiness") may receive an order to
scramble directly from the S.O.C by
means of landline/radio link between
the S.O.C & fighters on the operational readi-
ness platform (O.R.P). This link is known
as the (telescramble)

"C" Anti-aircraft Artillery Operations
Rooms. (A.A.O.R's) Orders controlling
the fire of heavy A.A. are passed
on from the S.O.C to A.A.O.R's. (one
to each gun defended area) (see
note) whence they are relayed to
the gun sites.

NOTE Selected areas (e.g. large industrial
districts) are defended by heavy A.A
guns. These are "gun defended areas"
& are clearly marked at G.S. his-
at. So.C's & G.C.I. stations. The
Sector Controller, to make the

best tactical use of both guns & fighters places certain restrictions to the one or the other when enemy A/c fly over or near these areas.

(see precis 9).

d) Light A.A. Control Centres. Vulnerable points (e.g airfield - radar stations etc) are defended by light A/A artillery. Orders controlling the use of L.A.A originated by the S.O.C are passed to the L.A.A control centre & are relayed by R/T to the gun positions.

Section III The Control System

of the United Kingdom

Precis 6. The Sector Operations Centre

Introduction

6.1 The United Kingdom field seaward approaches are divided into several sectors. The Commander of each sector is responsible to the A.O.C. in C. Fighter Command for maintaining tactical control of the air defences, fighter & guns deployed in his sector.

6.2 This task is undertaken at the S.O.C. and because he cannot remain there continuously, he normally delegates these duties to senior officers who act as Sector Controllers on a watch basis.

6.3 A Staff of "executive officers" each with a particular operational function implement the orders of the Sector Controller.

6.4 In order that the Sector Controller & other personnel may be briefed fully informed of the progress of the air battle, various displays are maintained before them in the

display hall

Lay out of "Ops" Room

6.5. The Sector Operations room consists of:-

(a) a display hall in which are arranged:-

(i). a G.S.M.

(ii). a Lighted Table

(iii) RATS Table.

(iv) a vertical screen for displaying long range continental each warning information.

(v) a number of cabins from which the users observe these displays

Displays

6.6. General Situation Map. The G.S.M. is a display map in the form of a table on which the air picture pro-duced by the C.C.F.C. = tracks plotted in adjacent sectors are displayed by means of symbols. The map shows.

(a) The Sector area with boundaries clearly marked.

(b) Considerable areas of adjacent sectors.

(c) Gun defended areas.

(d) Other details considered of importance to the controller (e.g. Sector airfield, G.C.I. Station, large towns etc)

67. Fighter Table. Tracks of airborne fighters under the sectors control together with tracks of Targets (if an interception is being attempted) are displayed on this table by means of symbols. The map shows :—

(a) The Sector area in larger scale than the G.S. in but with only small areas of adjacent sectors.

(b) gun defended areas

(c) Sector airfields & G.C.I. Station

68. RATS Table. "RAT" is a code word used to indicate low-flying hostile or unidentified a/c. Fighter A/C employed solely for the task of intercepting such raids, are known as "TERRIERS" information upon a large scale map showing —

(a) Coastal approaches to the Sector area.

(b) airfields from which "Terrier" A/C operate

(c) Gun defended areas

69. Continental Early Warning Screen. Tracks of enemy A/c which may constitute a threat to the U.K.

are passed direct from the enemirache
source to vertical early warning
screen at S.O.C's

(a) Construction. The screen consid
of a vertical sheet of perspex on
which is engraved a map of the
continental approaches to the U.K
to a range of approx. 300 Nautical
miles.

(b) Method of display. Plotters
working behind the screen display
the air picture by means of wax
pencils.

6.10. Tote display. To assist the
sector controller & his executive staff
the entire wall area opposite the
control cabins is taken up by various
tote display comprising :-

(a) squadron states tote. This shows
the current states of readiness of
the sector fighter squadrons as ordered
by the sector controller.

(b) Missions Tote. This shows detail
of the mission on which fighter A/c
under the sectors' control are engaged.

(c) A.A. States board. This shows
the various gun restrictions in force
within the gun defended areas
of the sector.

(d) Airfield States Board. This shows the current service-ability of sector airfields in terms of:-

(i) Local weather conditions

(ii) The aerodrome surface (e.g. bomb damage)

(e) R/T. Frequency allocation board. This display serves to remind the controllers of the availability of R/T frequencies both in the fighter A/c and ground control stations within the sector.

Note. The Totes Tote equipment & operation procedures are described in Precis 20.

Personnel & their Duties

6.11 Sector Controller. The sector commander's representative, he is responsible for:-

(a) Assessing the enemy threat to his sector by interpretation of the "air picture".

(b) Maintaining the sector fighter squadrons at states of preparedness appropriate to the air situation.

(c) Ordering action against enemy attack on his sector using fighter A/C & A.A. gunfire to gain the maximum success against the enemy.

(d) Implementing the orders of the controller in the Air Defence operations Centre.

(e) Liaising with controller of adjacent sectors.

(f) Authorising movement of friendly A/C through gun defended areas within his Sector.

2.12 Artillery Controller. The artillery controller is responsible for :—

(a) Advising the sector controller in the employment of A.A. defences.

(b) Advising the sector controller of the minute-to-minute capabilities of the A.A. Defences within the sector.

(c) Implementing the sector controller's plan for the integrated fighter / A.A. Defence battle. This responsibility he may discharge largely through his H.A.A. & L.A.A. executive.

(d) Liaison with artillery controllers at adjacent sectors. This enables him to inform the sector controller of adjacent sector's engagement plans & current A.A. control orders.

airfield state board. This shows the current service ability of sector airfields in terms of :-

(i) Local weather conditions
(ii) Aerodrome surface (e.g. bomb damage)

(e) R/T Frequency allocation Board. This display serves to remind the controllers of the availability of R/T frequencies used in the flight & ground control stations within the sector

NOTE. The roles, the equipment & operating procedures are described in precis 28.

Personnel & their duties

6.11. Sector Controller

The Sector Commander's representative, he is responsible for :-

(a) assessing the enemy threat to his sector by interpretation of the air picture.

(b) Maintaining the sector fighter squadrons at states of preparedness appropriate to the air situation.

(c) ordering action against enemy attacks in his sector, using fighter A/c & A.A. gunfire to gain the maximum success against the enemy.

(d) Implementing the orders of the controller in the Air Defence Operations Centre.

(e) Liaising with controllers of adjacent sectors.

(f) Authorizing movement of friendly A/c through gun defended areas within his sector

6.12. Artillery Controller. The artillery controller is responsible for :-

(a) advising the Sector Controller of the minute to minute capabilities of the A.A. defended employment of A.A. Defence.

(b) advising the sector controller of

of the employment minute to minute
capabilities of the A.A. Defences within
the sector.

(c) Implementing the sector
controller's plan for the integrated
fighter/A.A defence battle, that
responsibility he may discharge
largely through his H.A.A & L.A.A
executive.

(d) Liaison with artillery
controllers at adjacent sectors.
This enables him to inform
the Sector controllers of adjacent
Sectors' engagement plans against
A.A. raids etc. This information
is important when fighters
pass from one Sector to the next.

(e) Maintaining close liaison with AAOR
passing information on those developments
of the air battle which may effect
them.

(f) Ensuring that current meteor-
ological information is passed regularly
by A.A O.R S.

6.18. Executive officers These officers
work together in a cabin adjacent
to the Sector controller. They receive
orders from the S.C. over a common

intercommunication September ... ...

(a) Air Executive. This officer is
responsible to the sector controller for:—

(i) Ensuring (through wing ops. room
that the sector fighter squadrons are kept
at the states of preparedness ordered
by the sector controller, & that the squadron
state rote is correctly maintained.

(ii) The immediate scrambling of
fighters when ordered by the Sector
controller, giving initial interception
(course to steer & height to make)
to the pilots. (Note The sector controller
frequently elects to perform this task
himself)

(iii) Diversion of the sector fighters
to other airfields (ie) when their parent
airfield becomes unserviceable due
either to bad weather or enemy
attack.

(iv) Briefing (through wing ops Room)
aircrews before taking off on factors
affecting operational sorties (e.g.
restrictions over gun defended areas,
the general nature of the enemy
raids etc).

(v) Arranging air/sea rescue

(vi) Having displayed in the rote all

relevant & up-to-date information
concerning the weather state & the
state of sector airfields
(vii) Liaising with air executives of
adjacent sectors.
(b). Control Executive acts as a link
between the sector controller & the sector
G.C.I. Station & is responsible to the
sector controller for:-
   (i) allocating airborne fighters to
G.C.I. Station - through sector fighter
marshal (see para 14) & ordering
the handover of fighters from one G.C.I
to another (generally when they pass
out of the controlling G.C.I. Station
Radar cover)
(ii) allocating V.H.F R/T control channels
to be used between G.C.I. Station &
fighters
(iii) Briefing the G.C.I. Station & sector
fighter marshalls of the guns restricted
&c operative through out the sector
(iv) Liaison with his chief G.C.I.
controllers & the control & sectors
exits executive of adjacent sectors
(v) The safety of A/C under control
(vi) Informing the Sector controller

of the progress of operations.

Note (A) & (B) each have an assistant (usually a junior officer) who keep a log of operations & deals with routine matters.

(C) Heavy A.A. Executive Acts as the link between the artillery controller & the A.A. O.R's & is responsible for :—

(i) Issuing to appropriate A.A. O.R's & A.A. H.Q's in the S.O.C & Sector O.C.'s station the control orders required, to implement the artillery controller's direction, on the A.A. part in the air battle.

(ii) Imposing gun control orders to ensure the safety of fighters when they are scrambled, returning to base or crossing a gun defended area.

(iii) Notifying his artillery controller of state of A.A. defences & the progress of gun engagements.

(D) Light A.A. Executive Acts as the link between the artillery controller & light A.A. Control centres within the Sector, & is responsible for :—

(i) Alerting L.A.A. control centres in the Sector.

(ii) Implementing the artillery controller's directions on the control of L.A.A gunfire by passing the required orders to the L.A.A.G.C.C affected.

(iii) Passing at least one plot on every hostile or doubtful raid which shows a height of less than 10,000ft & which passes within 40 miles of any vulnerable point (V.P) in the Sector.

(iv) Keeping the artillery controller informed of the capabilities & state of L.A.A Defences.

Sector Fighter Marshal organization

6.14. Each Sector employs a "direction finding" (D/F) organization which fixes the position of airborne fighters whenever they transmit on the Sector "fixer" frequency. Control of this organization may be exercised either from the S.O.C or from selected G.C.I. Stations.

6.15 **Chief Sector Fighter Marshal** If it is desired to exercise control of the D/F organization from the S.O.C a Chief Sector Fighter Marshal is established is responsible to the sector controller for:—

(a) overall control of the Sector "fixer" system(s)

(b) The handling of all airborne Sector

fighters not under G.C.I. Control,

(c) Co-ordination of the work of the sector fighter marshals (see para 16)

16.16 Sector Fighter marshall. The Sector F.m. situated at a suitable G.C.I. station is responsible for the control of airborne fighters in accordance with the orders of the chief sector fighter marshal or in his absence, with the orders of the control executive especially in:-

(a) Rapid handover of fighters on becoming in [homing] to G.C.I. Stations.

(b) Control of A/C awaiting G.C.I. Control returning to base, or in transit to another G.C.I. by means of Radar or VHF. D/F fixes.

(c) Control of operation of one of the sector VHF D/F fixer systems.

(D) Plotting of fighters under his control to the local fighter display.

Note D/F fixes are determined at triangle station centres (one for each fixer system) situated within a single room in the S.O.C. (See precis 14)

17. Rats Controller. There is not to date a stabilized system for RATS interception. One method is for the rats controller to direct Terrier A/C against RATS

raids indicated by tracks on the raids
Table.

6.18. Sector Intelligence officer Is

responsible for informing the sector
controller on all matters relating to
air intelligence summarizing combat
reports. etc.

6.19. Meteorological (met) officer Is

responsible to the sector controller for
correlating all available weather
reports & producing a forecast of
weather for the sector area (usually
12 hr. forecasts) these forecasts are
made available to the various
users throughout the Sector

6.20 Liaison Officers. Facilities
are afforded at S.O.C's for liaison
officers – Naval civil defence etc.

6.21. N.C.O. i/c Watch & Floor Supervisors

are responsible to the sector controller
for the efficiency & discipline of all crew
members. their duties conform with
those of their opposite numbers in the
C.C.F.P. these duties are listed in the
appropriate F.C. Proc. Inst.

6.22 Plotters. The duties of sector plotters are detailed in appropriate F.C. Proc. Inst. The air pictures on the various tables are displayed by means of symbols, & the information is received on the:—

(a) G.S.m. — from sector C.C.&F.P. & adjacent C.C.&F.P.

(b) Fighter Plotters Table from:—
(i) Vertical Plotting screen at sector G.C.I. Station (see Precis 8)
(ii) Chief Sector & G.C.I. Fighter Marshal who report all fixes.

(c) Rats Table from selected G.C.I. fighter marshals who report all fixes

(d) Continental early warning system screen direct from continental reporting sources

6.23. Raid orderlies on the G.S.m. are raid orderly supplies display equipment to Box 4 plotters. The fighter & rats Tables each have one raid orderly. The display equipment varies at the separate tables but the duties of raid orderly as detailed in the F.C. Proc. Inst. on G.S.m. display apply to them all.

Tote Operations.

(a) Tote operators work behind the tote, each of which comprises a large number of horizontal slats.

(b) Information is displayed by placques which "hook in" to the slats.

(c) The passage of information to the tote is either:—

(i) Over landlines — when the tote operators wear headphones set.

(ii) over a loudspeaker system.

(d) The following are responsible for passing information to the tote operators —

(i) Wing ops. Room at airfields pass changes in A/C states as they are fulfilled.

(ii) Control Executive Assistant who passes details affecting the mission tote & R/T allocation board.

(iii) Air Executive Assistant who passes details affecting squadron states & airfield states totes.

(iv) HAA. Executives who passes gun restriction orders to the AA states board

6.25. Sector Tote Teller & Recorder.

Each sector employ a Tote Teller & a recorder who work as a team in the passing of the details of the current display in each Sector's squadron State Division Totes. To the Tote at the Air Defence Ops. Centre. Their duties are detailed in the appropriate F.C. Proc. Inst.

6.26. Sector Fighter Identification Teller. Liaises with the R.A.O. at the Sector O.C. P.I. in the recognition of fighter tracks on the O.C.G.P. table. He is positioned overlooking the sector fighter table & his task is to link tracks of fighters with tracks on the G.S.M. Details of his duties are laid down in the appro. F.C. Proc. Inst. on Fighter Plotting & Display.

6.27. The Triangulation Crew. The details of the duties of the personnel who man the "Triangulation Centre" at Sector see Precis Pt. paras 10, 11, 12, 13.

Communications.

6.28. Plotting & telling is carried out over direct landlines. All key personnel are provided with multi... key boards affordi

direct contact with those to whom frequent access is imperative.

NOTE, details of Techniques & procedures plotting & tote equipment are contained in Section VI of these precies.

(see extra precis in folder.

Section III
Precis 7. Air Defence Operations Centre

Introduction

71. The A.O.C.-in-C. Fighter Command is responsible for the air defence of of the U.K. a responsibility which he or his deputy the duty air defence controller discharges from one centre known as the Air Defence Operations Centre (ADOC)

72. From this centre the oper overall air defence effort is controlled & co-ordinated. The following are typical of the responsibilities of the Air Defence Controller:-

(A) To ensure that the state of readiness maintained by fighters throughout the country is adequate to meet attacks which may develope.

(b) To order the reinforcement of one sector by fighters of another.

(c) To decide which sector ~~by fighters~~ shall deal with an enemy raid approaching along or across the boundary ~~between~~ sectors.

(d) To distribute urgent intelligence reports to sectors e.g. To describe the tactics used by the enemy against one sector to other sectors.

3. At the A.D.O.e. Liaison is established with the other services & with civilian organisations such as Civil Defence & the B.B.C. whose operation & activities may be affected by the air battle.

The Ops Room

4. The operation room (fig I). accomodates the display necessary to keep the air defence controller & others informed of all relevant air activity throughout the sector. A glass fronted gallery overlooking the display room is occupied by:—

(a) The Air Defence Controller & his executive staff. They occupy the position directly facing the display.

(b) Liaison officers — Navy, army, allied forces, Civil Defence, etc.

7. **Displays** The displays ("S.S.m." + "Tote") represent the current air situation throughout all the sectors.

(a) S.S.m. details for each sector, ("air picture") — are received over broadcast lines direct from the C.C.F.P.S by plotters on the S.S.m. In the interest of clarity the less important raids may not be displayed. This S.Sm. shows :—

(i) A gridded (Georef) map of the whole defence area + its approaches.

(ii) gun defended areas.

(b) A "historical plot" of which a record of few particularly important raids can be retained for the time being.

(c) Tote. Each sector employs a Tote teller who passes to the ADOC. Tote operation details of current :—
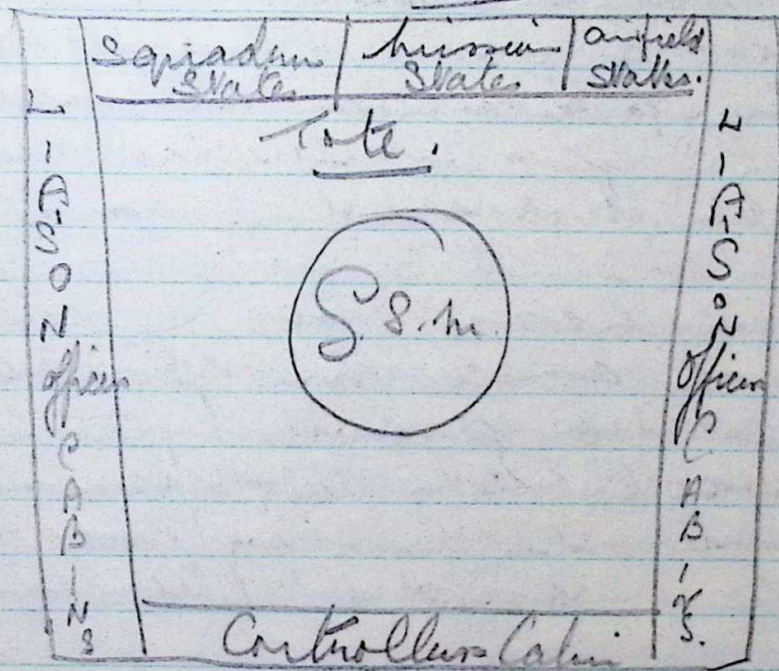
(i) Aircraft States. The state of readiness of the sector fighter A/C.

(ii) Mission — the mission allotted to sector's A/C.

(d) Airfield States. Details of current airfield service-ability are passed by sector Tote supervisor to ADOC. Tote supervisor who is responsible for maintaining this display.

For duties & personnel see Precis 6. (ADoc's are ~~supplementary~~ docking same as SOC's)

A.D.O.C.   FIG. II

Squadron States	mission States	airfield States

Tote.

I-ASO N Officer (left side vertical) — CABINS

S.8.m

I-ASO Officer (right side vertical) — CABINS

Controllers Cabin

Totes all A.D.O.C. see extra Precis 8.

Section III. Precis 8. G.C.I. Station

Introduction

8.1. <u>Function.</u> Ground Control Interception (GCI) Stations are strategically positioned centres from which fighters A/C are directed to meet enemy attacks. These stations have considerable overland cover & sometimes seaward cover, provided by rotating beam type Radar. Use is made of this source of information by the reporting organisation, each GCI Station includes a reporting element (G.H.B). No further mention will be made of the reporting responsibilities of GCI Station in this precis.

8.2. <u>Siting.</u> GCI. Stations are sited in the U.K. with the intention of :—

A) Utilizing the greatest seaward cover attainable by the radar employed.

b) Providing as far as possible complete radar cover.

Equipment & Layout.

8.3. Interception control at GCI Station is made possible by

A) <u>Radar.</u> The Radar used provides a visual presentation of the plan position

heights of fighters & targets.

(b) V.H.F (R/T). V.H.F. Radio-telephony equipment is installed at G.C.I. Stations & in all fighter A/C. This equipment provides two way communication between ground & air, & enables the pilot to be directed from the ground to intercept his target.

Radar

8.4 Radar at G.C.I. Stations is designed to afford the maximum all round gapless cover & comprises:-

(a) Type 7 & 14 control radar see precis 11, paras 4 & 6)

(b) Type 13 height finding radar(s) see precis 11 para 7.

8.5 The transmitters, receivers, & aerial arrays of the various radars are situated near the ops buildings. Signals received are fed to display consoles within the building.

8.6 V.H.F. R/T set having (usually) 20 channels is carried in all fighters. Several of these channels are allocated solely for control use. Pilots can select the channel required by means of push buttons.

8.7 Similarly, within G.C.I. Stations each interception controller is provided with V.H.F R/T facilities. He has a select-

box giving (usually) 10 channels. He operates the transmitter & receiver by remote control (V.H.F Transmitter & receiver ~~by one~~ stations are usually situated a short distance from S.O.P. stations)

8.8 Each V.H.F channel in the fighter is lettered. Each V.H.F channel at S.O.P. stations is numbered.

8.9 The use of multi-channel V.H.F communication permits:-

a) Radio selection both in fighter & at the S.O.P. station of the control channel allotted by the control executive at the SOC.

b) Several channels to be used at the same time to control several intercept. from one S.O.P.

c) Changeover of channels when:-

(i) Communication fails on a particular channel.

(ii) Fighters are passed from one control to another (e.g. interception controller to sector fighter marshall)

Operation Room. Layout Fig I.

8.10. The chief controller at the S.O.P maintains supervision of the work of his fighter marshall & interception controller

He occupies a cabin overlooking a display hall in which are the displays he requires. The fighter marshall occupies an adjacent cabin. Interception Controllers occupy separate interception cabin. In selected G.C.I.'s the fighter marshall is replaced by a sector fighter marshal who is responsible not to the local chief controller, but directly to the control executive at the S.O.C.

Display Hall.

8.11. The displays in a G.C.I display hall are similar to those at the S.O.C. They are overlooked by the chief controller & the fighter marshal / sector fighter marshal. The displays are:-

a) G.S.M. (smaller area than at S.O.C) The G.C.I. plotters receive the same broadcast from the C.C.F.P as the sector plotters.

b). Mission Tote. To permit rapid reference the G.C.I Mission Tote is divided into section. A section of it is allocated to each cabin including the F his cabin for the display of information applicable to mission

under control.

?c.) <u>Fighter Screen</u> This is a transparent
vertical plotting screen used to display
the progress of interceptions being
carried out in the cabins. (Plastic Sticks
or arrows being used) see Press 21.

d). A.A. States board. This is a
replica of the one at the S.O.C.

e) <u>Airfield States & Weather board</u>

ditto

f). <u>R/T. allocation board</u>. Used
by chief controller as reminder of
frequencies ~~not at work~~ available to
fighters.

<u>8.12 Chief controllers Cabin</u>. this assistant
overlooks the the displays this equipment
consist of :-

a) <u>Radar display consols</u>. On these
are displayed type 7 & 14 Radars.

b). V.H.F. R.T. facilities. These comprise a selection box - a microphone, & a loud speaker.

c). Intercommunication system. This is used for passing instruction to interception controllers.

8.13. Interception Cabins. Most G.C.I's have 3 interception cabins each known by colours red yellow or green. Their equipment comprises -

a) Display Consoles
i). Type 7. P.P.1.
ii). Type 7. Height/Range display
(iii) Type 14". PP1.
(iv) Type 13. Height

b). V.H.F. R/T Equipment.
(i) Channel selection box.
ii) Transmitter.
iii) Receiver.

c). Intercommunication system. Liaison with chief controller is effected in this way.

d) R Navigation Board: this a perspex, covered map covering an area of approximately 100 Nautical miles radius around the station.

Is used in conjunction with Navigation instruments to solve interception problems.

e). Wall display :- these include :-

i). Datum G.S.M. this is a vertical perspex screen fixed on the wall in view of the interception controller. Hostile & unidentified tracks shown on the G.S.M. in the display hall are broadcast & displayed (with wax pencils) on this screen to enable the controller to associate the position of his target with a response on his radar screen.

(ii) Weather board. this is similar to that in the display hall. it shows most information affecting air navigation (e.g. wind direction & speed at various altitudes, air temperatures, & barometric pressure at sea levels etc)

(iii) General information board. this is used to display information relative to the interception (e.g. type of fighters - call sign - time airborne - parent airfield etc).

f). Tracing table. Records of interception are plotted on tracing paper clamped over a map of the sector area. These records are used for subsequent analysis.

8.14   Fighter Marshal's Cabin / Sector
Fighter Marshal's. The fighter marshal
or Sec. F. Mr... occupies a cabin next to the
chief controller is provided with:-
    a). Radar display consoles. Type 7 & 14
    b). V.H.F. communication system.
    c). Multiphone key board
    D. D/R Navigation board.

8.15   R/T Monitoring Room R/T Channels
in use at S.C.I. station are monitored
& a log kept.

                Personnel & Duties
8.16   Chief Controller. the chief S.C.1. controller
is responsible to the control executive
for:-
    a). Tactical control of a/c in the Sec.
    b). The delegation of interception to
intercepting controllers
    c). Passing information regarding
orders for control to intercepting controllers
(eg. gun restrictions in force in S.Das.
etc)
    d). Liaison with adjacent chief
controllers in control matters.
8.17   Intercepting Controllers is responsible
to the chief S.C.1. controller for:-

a). Carrying out interception delegated to him.

b). Ensuring the plotters of fighters under his control to the total fighter display.

c). Handover of fighters to adjacent S.C.I's as ordered by chief controller.

8.18 S.C.I. Fighter marshall. Is responsible to the chief S.C.I. controller for:-

a). Control of fighters awaiting allocation to interception controllers or awaiting return to base under sector fighter marshals control.

b). Ensuring the plotting of fighters under his control to the local fighter display.

c). Rapid handover of fighters to other controls as ordered by chief controller.

Note Each controller is responsible for the safety of A/c under his control
The Sector fighter marshall is not part of the S.C.I. organisation.

8.9. Interception crew. Each interception controller is assisted in his work by

an interception crew. This crew consists of:

a) NCO i/c. He responsible to the interception controller for:-

(i) the efficiency training of his crew.
(ii) keeping a log of all watch activities.
(iii) maintaining a log of interception.
(iv) keeping the various wall displays up to date.

b. P.P.I. Readers. The cabin layout is arranged so that the two radar p.p.i. displays (type 7 & 14) are adjacent, with the control pt. between them. A plotter known as a P.P.I. reader sits ~~before~~ at each display with the interception controller between. The P.P.I. reader at the display which the controller is using to carry out an interception plots the tracks of fighters & target at least one every minute passing the details thus:-

(i) D/R Navigator
(ii) Recorder / Tracer.
(iii) Local fighter screen plotter.

c. Height Readers. Using type 7 (H/R) & type 13 displays the height readers he...

the controller informed of :-

(i) actual heights of targets & fighters in
the early stages of interception

(ii) Comparative height of T & f, during
closing stages of interception

d). D/R Navigator. He receives plots &
tracks of both F & P. AK from P.P.I. reader
Together with heights from height reader
With this information, usual information
& use of Nav. aids he is able to compare:-

(i) The course & indicated air speed of
target.

(ii) The approximate position of target
during periods when radar indication
fade from displays. He does this by a
method of Nav. known as dead reckoning
DR.

(iii) the fighters distance & course to
steer to its base at any time.

e). Recorder / Tracer. The R/Tor an
tracing paper, received from the various
crew members noting :-

(i) Time
(ii) course alterations ordered by controller
(iii) sightings by f/ Pilots.

(IV) Heights (actual & comparative)

(V) any other data on interception.

<u>G. Cabin G.S.m</u>. Plotters. He plots.
Selected tracks (H or X) on cabin wall
G.S.m.

<u>8.20. Chief S.C.i Controller Assistant</u> This
assistant's main duties are :-

(A) To keep a log of all instructions
received & passed by the chief controller

(b) To operate a telephone keyboard
& deal with calls of a routine Nature.

<u>8.21. Fighter Screen Plotter</u> One plotter con-
nected to each cabin by telephone
reproduces tracks of fighters & targets
on reverse of transparent vertical
screen.

<u>8.22 Fighter Screen Teller</u>. Seated on
the balcony overlooking the displays he
tells all tracks from the fighter screen
to the fighter table at the S.O.C.

<u>8.23. Cabin G.S.m Broadcast Teller</u>. Seated
on the balcony overlooking the G.S.m he
passes over broadcast lines to the cabins)

information on selected tracks indicated
by the chief controller.

8.24. R/T monitor Personnel are employed
to monitor S.O.1. R/T Channels & keep a
log of messages passed.
8.25. Other Personnel. All other duties
in the display hall conform closely to
those carried out by corresponding personnel
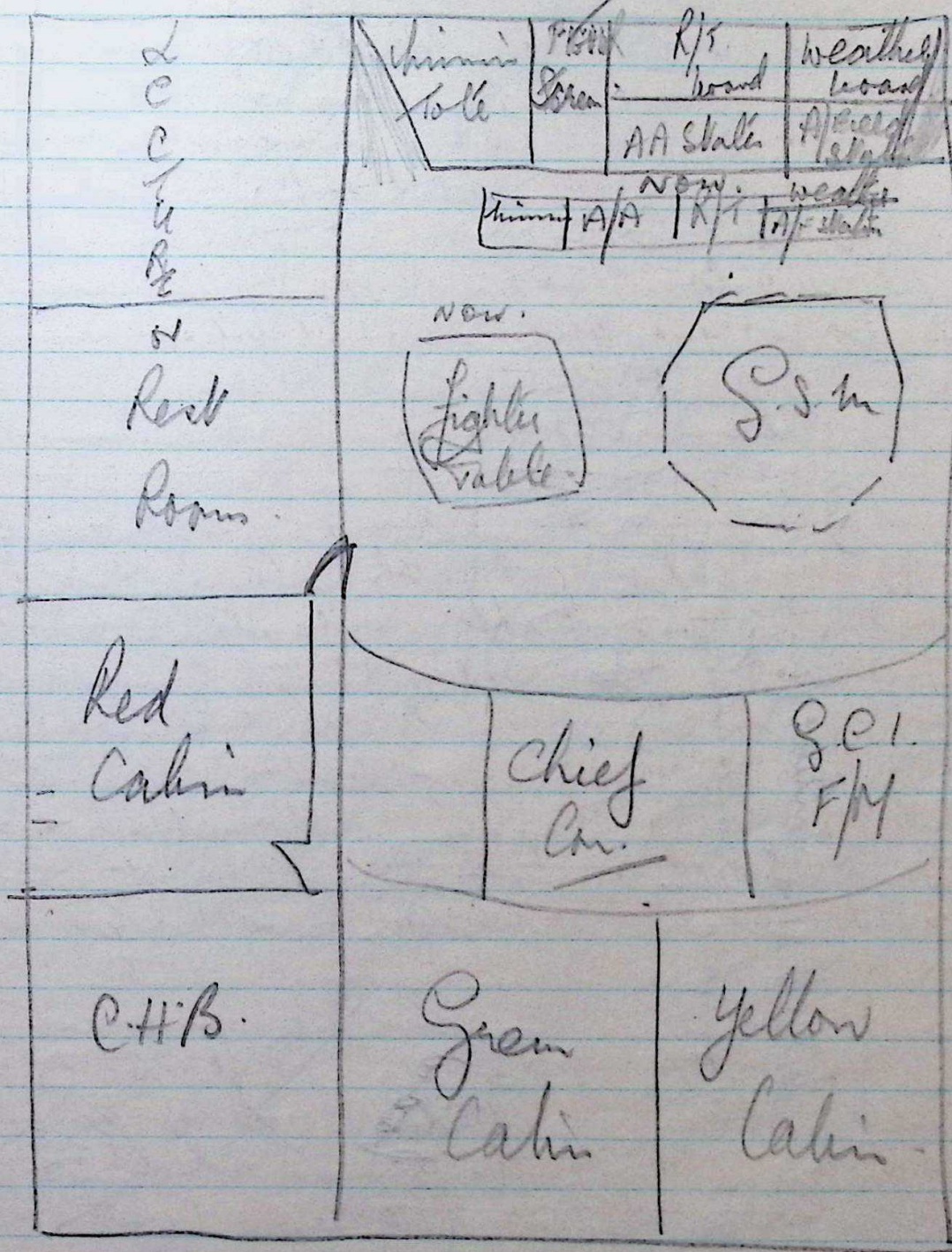at S.O.1 (see precis 6.)

Communications

8.26. Keyboard. Key personnel within
the S.O.T. Station (e.g. Chief Controller fighter
marshall, floor supervisor etc) are provided
with multi line keyboard which provide
direct contact with those to whom rapid
repeated contact is necessary. Lines from
these keyboards also afford contact with the
Stations operating P.B.X switchboards & to
Normal & P.O. services for calls of routine
nature.

8.27. Intercommunication. The chief controller
controls the use of the intercommunication
system by which rapid contact is made
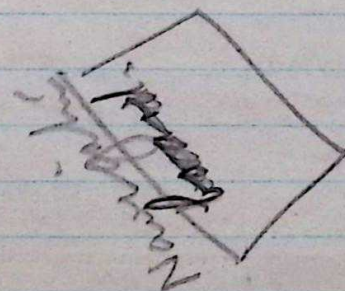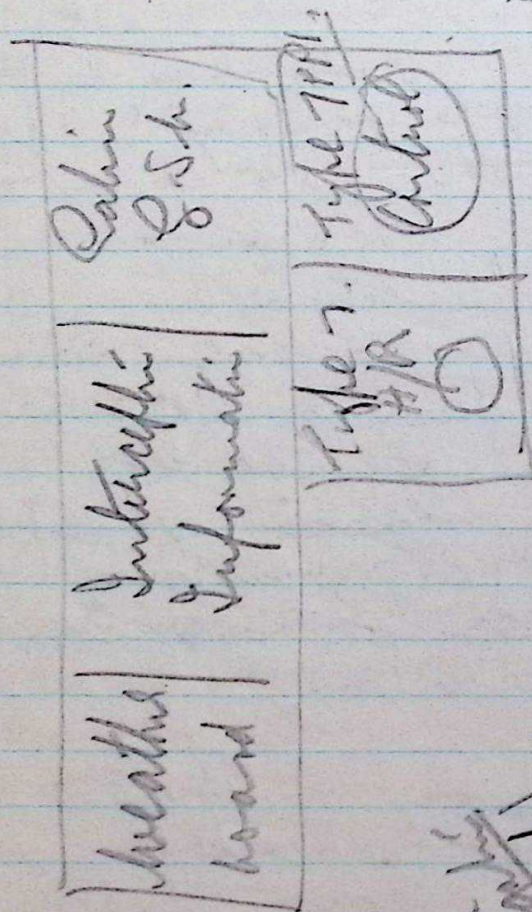between himself, interception controller
& F. marshall.

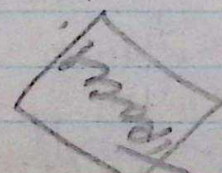**Fig I**   S.C.1. operation Building layout.

screen? out?.

Top-right grid boxes:
- drawing table | F/Way Screen | R/T board | weather board
-   | | AA stalls | Aircraft stalls

Now.:
- drawing | A/A | R/T | weather stalls

Now.
Fighter Table

S.S.M

Left column (top to bottom): L.C. / W.Br. & Rest Rooms.

Red Cabin

Chief Con.

S.C.1. F/M

C.H.B.

Green Cabin

Yellow Cabin

FIG 2

S. of I. Cabins.

| Weather board | Interface Information | Cabin & S.S. |

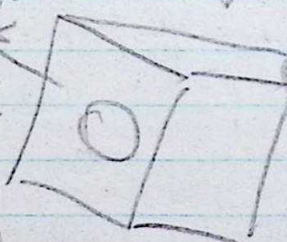Type 7. H/R   Type 7H. Cabinet

VHF/R1.

Type 15   Type upright

Nav...

chart
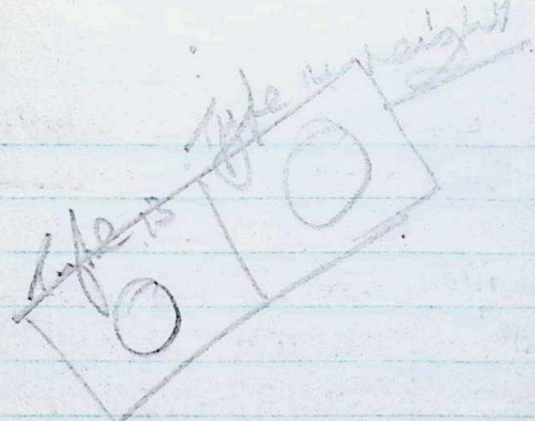
Precis 9.   Anti-aircraft artillery

91. The gun defences of the U/K together
with fighter aircraft comprise the weapons
of active air defence. It is only by skilful
co-ordination of these weapons that
attacks may be countered to the
maximum advantage of the defending
force.

92. Anti-aircraft artillery defences are of
two kinds Heavy AA & Light AA.

9.3. The function of the AA are to :-
    a) Destroy enemy aircraft &
    b) Prevent accurate attack.

94. The following paragraphs describe
the organisation, equipment, deployment
& operation of AA defences, the control orders
used to achieve co-ordination of the
operation of fighter & AA artillery are
set down & the methods of displaying
these orders are described.

Organisation in the U.K.

9.5 The A.A command is organised
in the following way:-
    a) Command HQ. is responsible for
policy & planning.

b). Groups of which there are five cover the U.K. each has under command a varying number of brigades.

c). Brigades are made up of a varying number of H A A & L A A regiments.

d) Regiments are of three kinds:—
(i) Heavy A A
(ii) Light A A
(iii) Light A A/searchlight.

Heavy A.A. Artillery

9.6. Heavy A A guns are capable of engaging enemy A/c flying at heights between 2,000 ft & the operational ceiling of the guns. Each H A A regiment mans a number of gun positions up to a maximum of 6 each of 4 guns.

9.7. The gun position. Each H.A.A gun position is equipped with:—

a) Four guns which are fitted with automatic loading, fuze setting & firing gear. Some types are remotely controlled.

b). Radar equipment which consists of:

(i) Tactical control Radar to give warning of approach of targets & give such for selection of suitable targets.

(ii) Fire Control Radar which "look on" to the selected target & feeds present position data to a —

(c) Predictor (electronic) used for rapid determination of the future point of aim of guns.

8. Deployment. Heavy AA guns are deployed to defend areas which the enemy are most likely to attack. These are known as Gun Fire Areas (GFA's).

99. Operation of HAA guns.

(a) Control orders for H.A.A. guns are originated by Sector Controllers, advised by their AA Controllers, by the H.A.A. Executive to A.A Ops Rooms (AAOR's).

(b) Army Tellers in the C.C.F.P. pass relevant E.W. information of the air picture to the A A Controllers A.A.O.R's. where it is displayed on a G.S.m. Table. This information is the only source of Target identification for the gun positions.

(c) A.A.O.R. Tellers relay relevant position of the air picture to gun positions. (These Tellers are called Duty Officers Assis. (ank) D.O.A's).

(d) An A.A.O.R. directs the activities of the many gun positions forming a G.FA. In large G.FA's there are may be more than one AAOR

(c) In many sectors there are several g.P.A's. & therefore several AAOR's.

Q.10. Gun Characteristics

a). LAA. guns are designed for use against Targets flying below 2,000ft.

b) Guns have high rate of fire & are power operated

Q.11(a). Deployment. L.A.A. guns are deployed around vulnerable points (V.P's) e.g airfield Radar station, factories etc.

Q.12 Observation posts. (O.P's) a ring of O.P's is sited about 8,000 yds forward of the outer guns to alert the gun crews & to recognise low flying A/C. They pass back to the gun position details of the attacking force i.e (ie Identity, strength, direction of approach etc). ____

Q.12A. Early warning E.W. is passed to the LAACC. Light A/A Control Centres) by a broadcast of the Rate table & Sm at the So by the LAA Executive.

Q.13. Operation of L.AA guns.

a). Control orders for use of L.A.A. guns are originated by Sector Controller, advised by their A/A Controller & are passed by the LAA Executive to the Light A.A. R/C Control Centre normally accommodated in a vehicle.

b). These control orders are transmitted by R/T from the LAACC to individual guns.

Light A/A Searchlights S.L. artillery

9.14 Searchlights are deployed with some L.A.A. guns to enable them to operate effectively at night by illuminated low-flying enemy A/C.

9.15. Equipment

a) guns - as for L.A.A Regiments.

b). Searchlights - each troop has a number of Radar controlled search lights & a number manually operated which follow & support the radar controlled ones. +-

9.16. Deployment

a). guns are deployed around V.P's.

b). Searchlights are used instead of observation post, their object being

to illuminate the target before it comes within the range of the gun.

9.17. Operation of gun positions & A.A. guns deployed with search-lights are controlled in the same manner as guns deployed without them.

9.18 Operation of searchlights

a) Searchlight positions are alerted by the L.A.A.O.C. from which the controller directs their search for targets.

b) The radar detect the target & when "locked on" search light beam are exposed.

c) Only when the target is illuminated by radar controlled searchlights do the manually operated searchlights expose.

Control of A.A. Gunfire

9.19. Levels of Control

Air Executive
(Briefs air crew
before take off
re A.A. restriction

Control Executive
(Ensure that
g.e.i. sector F.M.
are informed re
orders for
control of A.A.
guns.

NF

PF

NF

PF